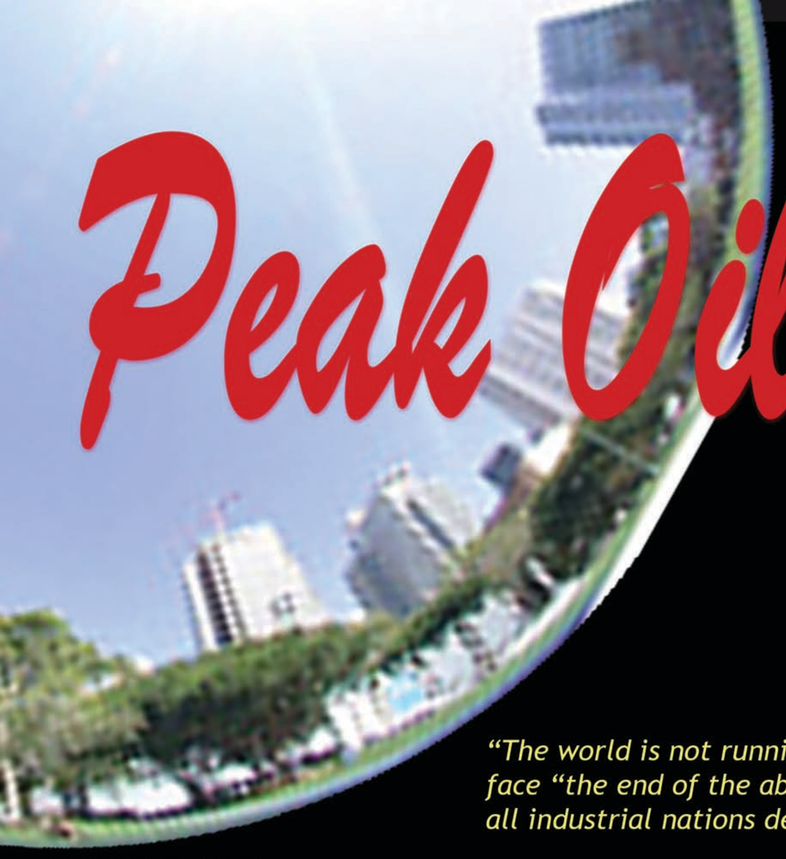
Peak Oil - the Tipping Point

The theory that the world's oil production rate will reach a maximum and then decline has been termed "peak oil."



(photograph courtesy of Pacific Gas and Electric Company, www.pge.com)

"The world is not running out of oil -" but it does face "the end of the abundant and cheap oil on which all industrial nations depend."

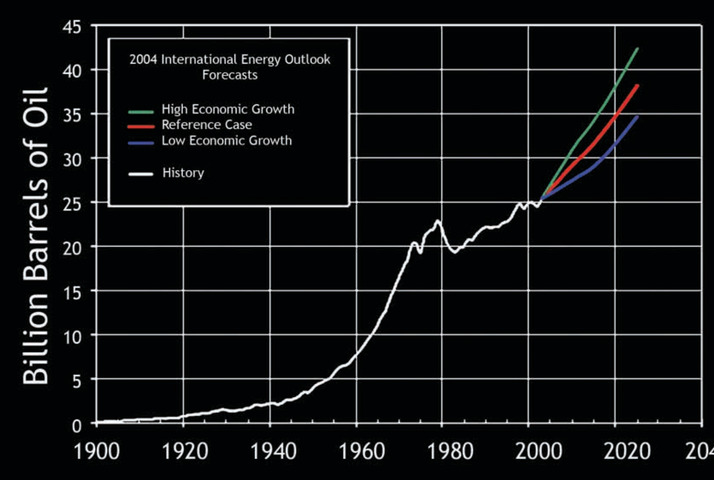
Colin J. Campbell and Jean H. Laherrere, 1998 Scientific American

When Will the World's Oil Production Peak?

Energy Information Administration

When will world production peak? EIA's short answer is not soon, but within the present century. A peak in world oil production is decades away...not years away.

(Guy Caruso, Administrator United States Energy Information Administration, DOE, 2005)



Global oil production approached 26 billion barrels of oil per year at the end of 2003.

(Guy Caruso, Administrator, U.S. Energy Information Administration, DOE, 2005)

The Hubbert Curve

M. King Hubbert

(photograph courtesy of Scientific American)

The Hubbert peak theory, named after M. King Hubbert, a geophysicist with Shell Oil Company, developed an analytical method for predicting when oil production from a known area would "peak" and begin to decline irreversibly. He presented his theory at an American Petroleum Institute meeting in 1956 at which time he predicted that U.S. oil production would peak in the late 1960s to early 1970s. He also predicted that world oil production would peak in 2000. The daily U.S. oil production peaked in October 1970 at 10.3 million barrels per day, and despite some temporary reversals, has been in constant decline since to 5.3 million barrels per day by August 2005 *(EIA)*. Annual U.S. oil production peaked in 1971. World oil production of over 80 million barrels per day *(Journal of Petroleum Technology)* had not peaked as of 2005.

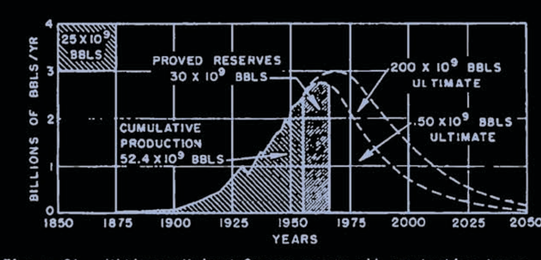


Figure 21 – Ultimate United States crude-oil production based on assumed initial reserves of 150 and 200 billion barrels.

(M. King Hubbert, "Nuclear Energy and the Fossil Fuels" March 1956)

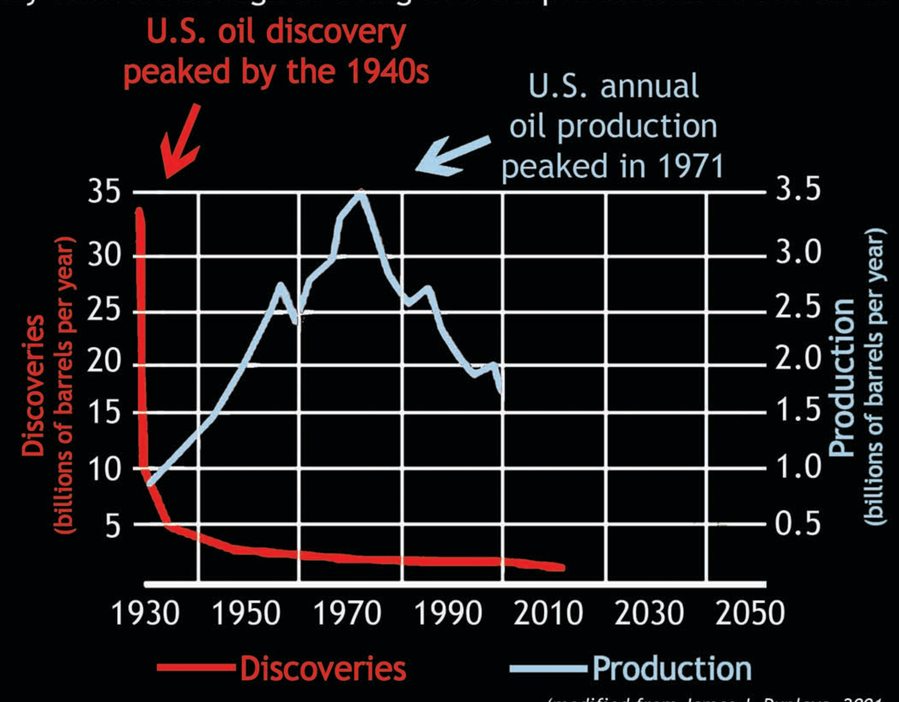
Depletion of an Exhaustible Resource

Whether from a single well, oil field, country, or the world, peak oil marks the point of maximum oil production. Peaking does not mean that oil is about to run out, only that a decline in production rate is inevitable since oil is an exhaustible resource. The volume of oil discovered every year reached an all-time high in the mid-1960s and has been declining ever since. Unless this trend is reversed, the stage is set for global oil production to peak and begin to fall.

Discovery vs. Production

U.S. Oil Production Peak

Although many experts were skeptical of his prediction, Hubbert was proven correct when U.S. daily oil production peaked at the end of 1970. Although the Prudhoe Bay oil field was discovered after 1970, even the great volume of oil produced from Prudhoe Bay was not enough to bring U.S. oil production out of its decline.



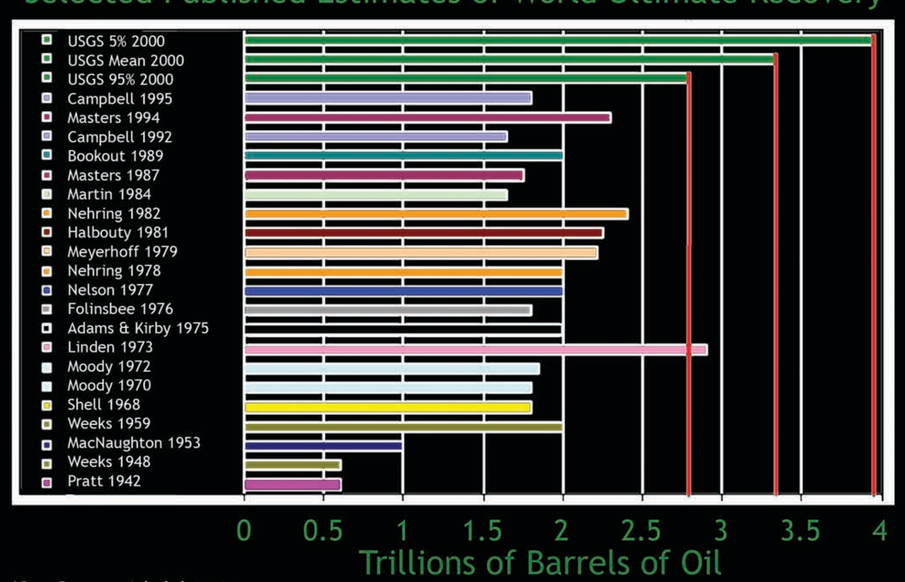
(modified from James J. Puplava, 2001, www.financialsense.com)

Peak Scenarios

The "Ultimate" Unanswered Question

Because ultimate recoverable oil (commonly called EUR) is always an estimate until (taken on a world-wide basis) all fields have been discovered, fully developed, and under full production, it becomes impossible to predict an exact date when world oil production will peak. Industry geoscientists generally believe that a peak in world oil production will occur when 50 percent of the world's EUR has been produced. Yet no one knows what the world's EUR is. Published estimates by various authorities over time are given in the chart below.

Selected Published Estimates of World Ultimate Recovery



(Guy Caruso, Administrator United States Energy Information Administration, DOE, 2005)

"There's no such thing as limitless, but the limits keep being expanded all the time. There are many offshore places that in the fullness of time will get explored... I don't know (how much oil) there is there, and in fact nobody does.

M.A. Adelman, 2004, www.catoinstitute.com

Selected Published Estimates of Peak Oil Timing

Peak year estimates are numerous from many sources. As new fields are discovered and developed fields mature, reserve estimates are revised to lead to a new production volume peak estimate, which in turn yield a new peak year prediction.

Year Published	By	Forecasted Peak Year / Range
1972	UN	by 2000
1977	Hubbert	1996
1981	World Bank	plateau around 2000
1998	IEA (WEO)	2014
1998	Campbell / Laherrere	2004
2000	EIA	2021-2167; 2037 most likely
2002	Campbell	2010
2003	Shell	after 2025
2003	Simmons	2007-2009
2004	CERA	after 2020

(excerpted from: Guy Caruso, Administrator United States Energy Information Administration, DOE, 2005)

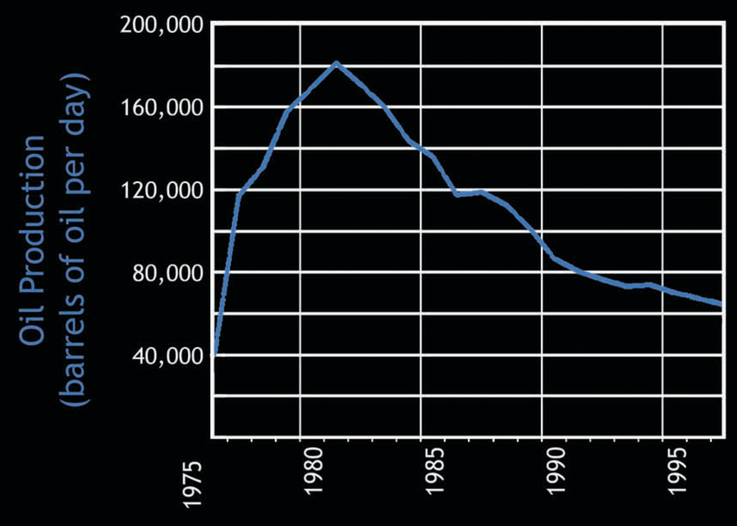
Naval Petroleum Reserve No. 1

NPR-1 Peaked in 1981

NPR-1 was opened to full production following the Production Open-Up Act of 1976. The field had produced off and on since its discovery in 1919 but remained largely shut-in after 1942 when the field was unitized. After open-up, the field was operated to achieve its maximum efficient rate (MER) of production. Under MER control, peak oil production occurred four years later in 1981.

Rig worker at former NPR-1, ca. 1980.

(photograph courtesy of DOE, www.25yearsofenergy.gov)



At its peak in July 1981, NPR-1 produced 181,000 barrels of oil per day.

(DOE, 2005)

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